Shear History Extensional Rheology Experiment II (SHERE II

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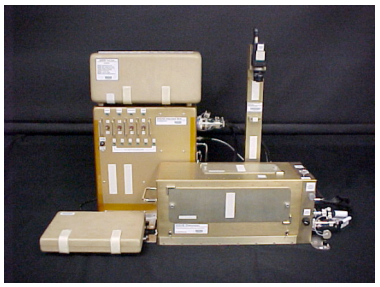
SHERE hardware in GBX



SHERE flight hardware

Objective:

- To investigate of the effect of preshearing on the stress/strain response of a model filled viscoelastic suspension (consisting of inert rigid non-Brownian microspheres dispersed in a dilute polymer solution) being stretched in microgravity.
  - Will investigate a controlled preshear history (from no preshear to very strong preshear) for a specified period. Then shear flow is halted and followed by exponentially increasing elongation profile axially to the polymeric liquid.

Relevance/Impact:

- Allows optimization of polymer processing operations that involved *complex flows*, i.e., both *shearing* ("rotation") and *elongation* ("stretching").
- Understanding the rheological properties of highly viscoelastic suspensions may be of paramount importance for lunar in-situ resource utilization and for the future construction of a permanent lunar base.

Development Approach:

- SHERE flight experiment and design leverages off of the Extensional Rheology Experiment (ERE) sounding rocket experiment which studied the uniaxial stretching flow of a polymeric liquid.
- Protoflight approach used for flight hardware development.
- Fluid modules returned from ISS, cleaned and refilled with new flud samples.
- A high fidelity operational trainer is available.
- Experiment is set up and run by an astronaut. Some telemetry is viewed on the ground.

ISS Resource Requirements

Accommodation (carrier)	Microgravity Science Glovebox
Upmass (kg) (w/o packing factor)	29.1 - Main Hardware (on orbit) 7.3 - Fluid Module Stowage Tray
Volume (m^3) (w/o packing factor)	0.100 - Main Hardware (on orbit) 0.012 - Fluid Module stowage Tray
Power (kw) (peak)	0.085
Crew Time (hrs) (installation/operations	33 crew time
Autonomous Ops (hrs)	24
Launch/Increment	ULF-5 (Middeck) - Fluid Module stowage Tray

Project Life Cycle Schedule

Milestones	**SCR**	**RDR**	**PDR**	**Design Rvw**	**VRR**	**Ph III FSR**	**FHA**	**Launch**	**Ops**	**Return**	**Final Report**
Fluid Modules (25)	**N/A**	**N/A**	**N/A**	**2Q10**	**N/A**	**2Q10**	**3/10**	**6/10**	**Inc 22-24**	**TBD**	
Documentation	Website: http://spaceflightsystems.grc.nasa.gov/Advanced/ISSResearch/MSG/SHERE/ eRoom: SHERE				SRD: signed, in eroom EDMP:			Project Plan: in eroom SEMP: N/A			